Portland Harbor Sample Receipt, Analysis, and Results Report

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Introduction

This report is part of a baseline fish tissue study at the Portland Harbor Superfund Site (Portland Harbor Site). The U.S. Environmental Protection Agency (EPA) is conducting this study as part of the Portland Harbor Remedial Investigation and Feasibility Study (RI/FS) and in conformance with the National Contingency Plan. The City of Portland is providing assistance at EPA's request.

The baseline fish tissue study is referred to as the Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study. The study is intended to provide an up-to-date baseline of polychlorinated biphenyls (PCB), semivolatile organic compounds (SVOC), polycyclic aromatic hydrocarbons (PAH), and pesticides in smallmouth bass. EPA will use the updated baseline data as a point of comparison to future contaminant concentrations measured in smallmouth bass during and following remedy implementation. The area being investigated is referred to as the Portland Harbor Study Area (study area).

This report summarizes sample receipt, analysis, and results for 68 fish tissue samples collected during the baseline fish tissue study. The samples were collected in accordance with a sampling and analysis plan (SAP) prepared for the EPA by GSI Water Solutions, Inc. (GSI) (GSI 2011).

The report includes three main sections. The first section discusses the receipt of samples by EPA, subsequent sample processing, and sample shipment (to and from the analytical laboratories). The second section discusses the analysis of samples at each laboratory and provides a summary of data validation results. The final section discusses the sample results, including a discussion of data reduction steps used to calculate summed totals to be used in the RI/FS and risk assessments (RA). Tables of results and the data validation report are attached to this report.

This report was prepared by Tetra Tech under EPA contract number EP-W-07-078. Tetra Tech was responsible for subcontracting laboratory analysis to Pace Analytical Laboratories (Pace), preparing the data for database entry, and preparing this report. For more information, please see the Portland Harbor website: http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/ptldharbor.

Sample Receipt

Samples were initially collected by GSI and brought to the EPA Manchester Laboratory (MEL) in Port Orchard, Washington. Samples were then sent to KAP Technologies Inc. (KAP) in The Woodlands, Texas, for homogenization and creation of two homogenized aliquots. KAP retained one aliquot for each sample. The other sample aliquot was shipped to Pace in Minneapolis, Minnesota, for analysis. The chains of custody are included in Appendix B to this report.

Originally, 82 fish samples were collected. Figure 1 shows the locations of the samples

collected (more detailed location maps are included in the Field Sampling Report prepared by GSI). Of the 82 fish collected, 50 samples were prepared incorrectly by KAP, and were not analyzed. The error resulted in portions of the sample being discarded, so that it was impossible to reconstruct the sample aliquots correctly. The remaining 32 samples were prepared correctly, so that two samples were prepared for each fish sample; a fillet and a body without fillet. Each fish sample was processed into two separate samples; a 'fillet' sample and a 'body without fillet' sample (the remaining mass of the fish) in accordance with Appendix C of the SAP (GSI 2011). Each sample was homogenized for analysis. Table 1 summarizes the samples collected, and identifies which samples were not analyzed as a result of the preparation error noted above.

In addition to the fish samples, three rinsate blanks and one proof blank were prepared for analysis.

Pace analyzed each sample for the following analyte groups:

- PCB following SOW SOM01.2 and EPA Method 1668C.
- Lipids following SOW SOM01.2 and EPA Method 1668C.

After analysis and data validation were complete, the remaining sample volumes were returned from KAP and Pace to the MEL to be archived.

Data Validation

EPA Region 10 quality assurance (QA) staff validated the data following Guidance on Environmental Data Verification and Validation (EPA 2002), EPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (EPA 2008), and EPA Region 10 Standard Operating Procedure (SOP) for the Validation of Method 1668 Toxic, Dioxin-like PCB Data (EPA 1995). A Stage 4 data validation was conducted on all analytical data (EPA 2012).

Table 2 summarizes the results of the data validation (see tables attached to this report). The data validation report is included in Appendix B to this report.

EPA made very few data qualifications during the data validation process. Qualifications were made for method and proof blank contamination, chromatographic interferences, and chromatographic peak saturation.

Data validation included an assessment of blank samples, including four rinsate blank samples collected during sample homogenization. Several analytes were qualified as estimated or non-detect based on trace laboratory blank contamination. The rinsate blank samples were analyzed for PCB congeners, and the results were compared with associated samples. Although a few congeners were detected at trace levels, EPA did not qualify any samples based on rinsate blank contamination because no detected sample results were detected at concentrations within 5 times higher than the value in the associated rinsate blank (EPA 2012).

Sample Results

In addition to the raw results, the SAP (GSI 2011) specifies two sets of rules for summing data and retaining or modifying qualifiers and reducing the data to a single value per sample and summation group. The two sets of rules include one for use in the RI and another for use in the RA and background data sets, in accordance with the Portland Harbor RI/FS guidelines (Kennedy/Jenks 2004).

Summation rules for the RI data set are as follows:

- For samples with at least one detected result for the summed analytes included in the total:
    - Detected concentrations are included in the calculated total.
    - Non-detected concentrations are not included in the calculated total (i.e., treated as zero).
- For samples with no detected results:
    - The highest detection limit is used for the summation. The calculated total result is indicated with a U to indicate it was not detected.

Summation rules for the RA and background data sets are as follows:

- For samples with at least one detected result for the summed analytes included in the total:
    - All detected concentrations are included in the calculated total
    - All non-detected results for analytes, if they were detected at least once in the RA data set within the study area for a given medium (in this case, fish tissue), are included in the calculated total at one-half the detection limit.
    - All non-detected results for analytes, if they were not detected in any sample within the RA data set within the study area for a given medium, are not included in the calculated total (i.e., treated as zero).
- For samples with no detected results, where some of the summation analytes are determined to be present within the study area:
    - The highest detection limit for analytes present within the study area is used for the summation. The calculated total result is indicated with a U to indicate it was not detected.

Data qualifiers were carried through the summation procedure. If all the analytes were not detected, a “U” qualifier is applied to the summed data to indicate that all results were reported as not detected. All calculated totals are flagged with a “T” qualifier to indicate that they are mathematically derived values.

Once the summations were complete, an overall concentration was calculated for each fish sample. These concentrations are reported as “whole body (calculated)” in the tissue field. The whole body concentrations were calculated only for the summation analytes (and not including the homolog summations), and were calculated using the following equation:

$$C_{wb} = \frac{\left(C_f \cdot M_f\right) + \left(C_{bwof} \cdot M_{bwof}\right)}{\left(M_{fillet} + M_{bwof}\right)}$$

where:

C_{wb} = the calculated concentration of the whole body fish sample
C_f = the measured concentration of the fillet fish sample
C_{bwof} = the measured concentration of the body without fillet fish sample
M_f = the mass of the fillet fish sample
M_{bwof} = the mass of the body without fillet fish sample

Table 3 lists the summation group results to be calculated for each sample. Table 4 summarizes the laboratory data, including the summed totals as defined in Table 3 and the summation rules listed above.

References

GSI Water Solutions, Inc. (GSI). 2011. Sampling and Analysis Plan, Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study, Willamette River, Portland, Oregon. Prepared for U.S. Environmental Protection Agency. September.

GSI. 2012. Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study, Field Sampling Report, Willamette River, Portland, Oregon. Prepared for U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, and City of Portland. June.

Kennedy/Jenks. 2004. Portland Harbor RI/FS Technical Memorandum: Guidelines for Data Averaging and the Treatment of Non-detected Values for the Round 1 Database. Prepared for the Lower Willamette Group, Portland OR. Kennedy/Jenks, Integral Consulting, Inc., Windward Environmental, LLC.

U.S. Environmental Protection Agency (EPA). 1995. EPA Region 10 SOP for the Validation of Method 1668 Toxic, Dioxin-like PCB Data. EPA Region 10, Environmental Services Division, Seattle, WA. December 8.

EPA. 2002. Guidance on Environmental Data Verification and Validation. EPA QA/G-8. EPA/240/R-02/004. EPA Office of Environmental Information, Washington DC. November.

EPA. 2008. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. USEPA-540-R-08-01. EPA Office of Superfund Remediation and Technology Innovation. June.

EPA. 2012. Memorandum. Subject: Data Validation Report for the full list of 209 Polychlorinated Biphenyl Congener (PCB Congeners) Analyses of Small-Mouthed Bass Tissue Samples Collected for the Portland Harbor RI/FS BACE Project Numbers: 10180829, 100180826, 101867, 101870. From: Ginna Grepo-Grove, R10 QA Manager, Office of Environmental Assessment, USEPA. To: Chip Humphrey and Matthew Lambert. June 13.

Figures

Tables

Appendix A

Chain of Custody Forms

Appendix B

Data Validation Report